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Environmental and socio-demographic determinants of dengue fever in Colombo City, Sri Lanka

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Dengue fever has increased exponentially in Sri Lanka, from 24.4 cases per 100,000 in 2003 to 165.3 per 100,000 population in 2013. Although early warning systems using predictor models have been previously developed in other settings, it is important to develop such models in each local setting. Further, the ability of these models to be applicable at smaller geographic units will enhance current vector control and disease surveillance measures. The aim of this paper was to identify environmental and socio-economic status (SES) risk factors that may predict dengue fever at the Gram Niladhari Divisions (GND) level (smallest administrative unit) in Colombo city, Sri Lanka. These factors included landcover classes, amount of vegetation, population density, water access and neighborhood SES as determined by roof type. A geographically weighted regression (GWR) was used to develop the prediction model.

A total 55 GND units covering an area of 37sq.km² were investigated. We found that GND units with decreased vegetation, higher built-up area, higher population density and poor access to tap-water supply were associated with high risk of dengue; the pertinent GND units were concentrated in the center of the city.

This is the first study in Sri Lanka to include both environmental and socio-demographic factors in prediction models for dengue fever. The methodology may be useful in enhancing ongoing dengue fever control measures in the country, and to be extended to other countries in the region that have an increasing incidence of dengue fever.